# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2

**Title:** SWITCHYARD

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $5.2

**Assigned Contingency %** 20.8%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $1.2 |
| Effort | $2.2 |
| Ohd | $1.1 |
| Conting | $0.7 |
| Total | $5.2 |

**WBS Dictionary Definition:** Provides for the modification and upgrade of the existing Slow Extracted Beam in order to meet RSVP beam transport requirements. This includes shielding, electrical, mechanical, & vacuum modifications. New instrumentation, security system, and controls will be provided. The NASA experiment will also be relocated to the switchyard.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 24% | Engineered Design | 20% |
| Engineered Conceptual | 45% | Scientist Conceptual | 5% |
| Guess | 5% | Other (specify) | 1% |
| | | Total | 100% |

**Status of Hardware/Software Development:** All of the magnets, power supplies, A-C power, cooling water, and shielding exist. Most of the infrastructure, high power cabling, and installation materials will be re-used.

**Issues (funding, collaborator shortage, engineering help, etc.):** None

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.1

**Title:** Project Support

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.3

**Assigned Contingency %** 16%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.0 |
| Effort | $0.2 |
| Ohd | $0.1 |
| Conting | $0.0 |
| Total | $0.3 |

**WBS Dictionary Definition:**

Provides for overall Project support, co-ordination between technical groups, documentation, and installation supervision for modifications to the switchyard

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 0% | Engineered Design | 0% |
| Engineered Conceptual | 0% | Scientist Conceptual | 0% |
| Guess | 0% | Previous Proj.Support efforts | 100% |
| | | Total | 100% |

**Status of Hardware/Software Development:** NA

**Issues (funding, collaborator shortage, engineering help, etc.):** None

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04

**WBS No.** 1.4.2.2

**Title:** Shielding Modifications

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.1

**Assigned Contingency %** 2200%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.0 |
| Effort | $0.0 |
| Ohd | $0.0 |
| Conting | $0.0 |
| Total | $0.1 |

**WBS Dictionary Definition:** Provides for the modification of existing shielding in the switchyard in two areas: Steel shielding will be installed between the AGS ring & the switchyard,allowing access to the switchyard while ions are circulating in the AGS ring. The downstream switchyard labyrinth will be modified to allow easy access to the switchyard

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 10% | Engineered Design | 0% |
| Engineered Conceptual | 85% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** N/A

**Issues (funding, collaborator shortage, engineering help, etc.):** None

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.3

**Title:** Electrical Modifications

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.7

**Assigned Contingency %** 24%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.2 |
| Effort | $0.3 |
| Ohd | $0.2 |
| Conting | $0.1 |
| Total | $0.7 |

**WBS Dictionary Definition:**

Provides for modifications to the existing 480V power distribution for power supplies to meet NEC code and redistributes power in the switchyard for new equipment. Modifies existing power supplies for a new control system and refurbishs them as needed.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 37% | Engineered Design | 45% |
| Engineered Conceptual | 13% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** The power modification uses standard commercial AC breakers installed in our existing distribution panels. The power supply modification uses commercial controllers interfaced with with existing AGS power supplies. This modification has been successfully completed for our most common power supply.

**Issues (funding, collaborator shortage, engineering help, etc.):** none

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.4 **Title:** Mechanical Modifications

**Preparer/Manager:** Al Pendzick **Current Cost Est.(FY05 $M)** $0.3

**Assigned Contingency %** 17%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.1 |
| Effort | $0.1 |
| Ohd | $0.0 |
| Conting | $0.0 |
| Total | $0.3 |

**WBS Dictionary Definition:** Provides for two beam plugs & modifies 4 existing magnets for the new beam line. The beam plugs, together with WBS 1.4.2.2 will allow access to downstream radiation areas under certain machine cine operating conditions.Also provides for non-radioactive cooling water supply to water cooled power supplies.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 20% | Engineered Design | 65% |
| Engineered Conceptual | 12% | Scientist Conceptual | 0% |
| Guess | 3% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** Beam plug design is a copy of the NSRL beam plug. All the magnets are in excellent condition.

**Issues (funding, collaborator shortage, engineering help, etc.):** none

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.5

**Title:** Installation

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.9

**Assigned Contingency %** 1940%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.1 |
| Effort | $0.5 |
| Ohd | $0.2 |
| Conting | $0.1 |
| Total | $0.9 |

**WBS Dictionary Definition:** Provides for the removal of 22 magnets and the installation of 10 magnets and 2 beam plugs in the switchyard

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 5% | Engineered Design | 0% |
| Engineered Conceptual | 0% | Scientist Conceptual | 0% |
| Guess | 5% | Past Experience | 90% |
| | | Total | 100% |

**Status of Hardware/Software Development:** NA

**Issues (funding, collaborator shortage, engineering help, etc.):** none

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.6

**Title:** Vacuum

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.5

**Assigned Contingency %** 24%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.2 |
| Effort | $0.2 |
| Ohd | $0.1 |
| Conting | $0.1 |
| Total | $0.5 |

**WBS Dictionary Definition:** Provides for the design, fabrication and installation of a vacuum system in th the AGS ring, "A" line & "B" line and modifies the existing controls for these areas.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 20% | Engineered Design | 0% |
| Engineered Conceptual | 75% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** The vacuum pumps and hardware are commercially available. The control system needs only minor modifications

**Issues (funding, collaborator shortage, engineering help, etc.):** Not scrubbed

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.7

**Title:** Conventional Modifications

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $0.1

**Assigned Contingency %** 17%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.0 |
| Effort | $0.0 |
| Ohd | $0.0 |
| Conting | $0.0 |
| Total | $0.1 |

**WBS Dictionary Definition:** Provides a new enclosure for instrumentation and controls, fire detection, protection, and dehumidification of the Switchyard cave.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 35% | Engineered Design | 0% |
| Engineered Conceptual | 60% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** All of the hardware is commercially available

**Issues (funding, collaborator shortage, engineering help, etc.):** None

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.8

**Title:** Instrumentation

**Preparer/Manager:** Al Pendzick

**Current Cost Est.(FY05 $M)** $1.2

**Assigned Contingency %** 20%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.4 |
| Effort | $0.4 |
| Ohd | $0.3 |
| Conting | $0.2 |
| Total | $1.2 |

**WBS Dictionary Definition:** Provides for the relocation & upgrade of the existing switchyard instrumentation for the new RSVP beam transport. This includes an upgrade of the loss monitor system, EPM's, scanning target, C11 plunging SWIC, C10 SEM, and motion controls. A new current transformer will be installed at C36.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 50% | Engineered Design | 20% |
| Engineered Conceptual | 25% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** This is a straight-forward upgrade of existing technology except for the EPM's where some R&D is needed.

**Issues (funding, collaborator shortage, engineering help, etc.):** not scrubbed

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.9 **Title:** Security Modifications

**Preparer/Manager:** Al Pendzick **Current Cost Est.(FY05 $M)** $0.4

**Assigned Contingency %** 20%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.1 |
| Effort | $0.2 |
| Ohd | $0.1 |
| Conting | $0.0 |
| Total | $0.4 |

**WBS Dictionary Definition:** Provides for a PLC based access control system for the 3 gates in the switchyard, similar to the NSRL system. This includes gates, key trees and iris scanner, CATV, chipmonks, crash and sweep stations.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 30% | Engineered Design | 30% |
| Engineered Conceptual | 35% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** Most of the hardware is commercially available. The software has not been developed but will be similar to the NSRL beam line software.

**Issues (funding, collaborator shortage, engineering help, etc.):** None

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.10 **Title:** Computer Controls

**Preparer/Manager:** Al Pendzick **Current Cost Est.(FY05 $M)** $0.3

**Assigned Contingency %** 23%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.1 |
| Effort | $0.1 |
| Ohd | $0.0 |
| Conting | $0.1 |
| Total | $0.3 |

**WBS Dictionary Definition:**

All controls interface hardware fc or the switchyard magnet power supplies and t instrumentation will be procured, assembled, installed and tested. Standard software tools and database are configured, installed and tested.

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 36% | Engineered Design | 32% |
| Engineered Conceptual | 30% | Scientist Conceptual | 0% |
| Guess | 2% | Other (specify) | |
| | | Total | 100% |

**Status of Hardware/Software Development:**

No hardware development required. Use of standard RHIC controls elements. Software development is limited to configuring and installing standard components and creating database elements for new modules.

**Issues (funding, collaborator shortage, engineering help, etc.):**

This WBS has not been scrubbed.

# SWITCHYARD
# RSVP Review Status Sheet

**Date:** 12/29/04 12:00 AM

**WBS No.** 1.4.2.11 **Title:** NASA Relocation

**Preparer/Manager:** Al Pendzick **Current Cost Est.(FY05 $M)** $0.1

**Assigned Contingency %** 22%

**Cost Elements (FY05 $M)**

| | |
|---|---|
| Matls | $0.0 |
| Effort | $0.1 |
| Ohd | $0.0 |
| Conting | $0.0 |
| Total | $0.1 |

**WBS Dictionary Definition:** Provides for the relocation of the NASA experimental area, instrumentation and control trailer from the A-3 line to the switchyard

**Technical Level of Confidence: (choose one)**

| | | | |
|---|---|---|---|
| Prototype Demonstrated | | Elements Built & Tested | |
| Similar System Exists | X | Similar Technology Works | |
| Novel System Concept | | No Candidate Concept Yet | |
| Other (Comment) | | | |

**Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)**

| | | | |
|---|---|---|---|
| Commercial Product | 10% | Engineered Design | 65% |
| Engineered Conceptual | 20% | Scientist Conceptual | 0% |
| Guess | 5% | Other (specify) | 0% |
| | | Total | 100% |

**Status of Hardware/Software Development:** Most of the existing hardware will be relocated, the remaining equipment is commercially available.

**Issues (funding, collaborator shortage, engineering help, etc.):** The proposed position in the switchyard requires installation/removal of the "B" line vacuum. This will add an additional radiation burden for operations and experimental personnel.